



BERNALILLO COUNTY PEDESTRIAN & BICYCLIST CRASH DATA ANALYSIS 2008-2011

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Cover Photo of Saturday Flea Market
at Central Ave. and the NM Expo (Fairgrounds)

INTRODUCTION

This report was created by the Mid-Region Council of Governments (MRCOG) with support from Bernalillo County through the Centers for Disease Control and Prevention's Community Transformation Grant. The inspiration for this report began in 2013 with the West Central Road Safety Audit. This audit shed light on both the limitations and possibilities of using regularly collected crash data to improve the region's understanding of pedestrian and bicycle safety.

This report focuses on the 744 crashes involving pedestrians and the 690 crashes involving bicyclists from 2008 to 2011 that occurred in Bernalillo County. These crashes come from reported crashes described in the New Mexico Uniform Crash Report. In order for a crash to be entered into the crash database, it must have occurred on a public roadway, involved at least one motor vehicle, and resulted in \$500 of damage or personal injury. If a crash occurred on a trail or if it did not involve a motor vehicle, it would not be included in this report. At the time of writing, crash data after 2011 was not available. These data were collected by the New Mexico Department of Transportation Traffic Safety Bureau and geocoded by the University of New Mexico Geospatial and Population Studies Traffic Research Unit.

The maps provided in this report can also be viewed at <http://tinyurl.com/BerncoPedBikeCrashMaps>. This web application allows for a more in-depth view of the data.

Key Findings

Key findings that are described in further detail in this report include:

- In 2011, New Mexico was ranked 5th in the nation for pedestrian fatalities per capita. However, because bicycle fatalities are relatively rare events, New Mexico's bicycle crash ranking fluctuates significantly from year to year.
- Not surprisingly, pedestrian and bicycle fatalities are far more likely to result in death or injury than crashes involving motor vehicles alone. In Bernalillo County, pedestrian crashes are 25.5 times more likely to be fatal and bicyclist crashes are 4 times more likely to be fatal.
- Of the 38 fatal pedestrian crashes, 50 percent involved a pedestrian who was intoxicated. Although it is difficult to determine who is at fault with these data, in 31.2 percent of pedestrian crashes and 36.2 percent of bicyclist crashes, the officer reporting on the crash indicated that the pedestrian or bicyclist did not contribute to the crash.
- Central Ave and San Mateo have the highest number of both pedestrian and bicyclist crashes. Several intersections along these corridors were especially dangerous, including Central and San Mateo, San Mateo and Montgomery, Central and Louisiana, and Central and Eubank.
- More than half of bicycle crashes—61.7%—occurred on roadways without bicycle infrastructure.
- Pedestrian crashes are correlated with areas of high pedestrian activity, including major transit hubs, UNM, and Downtown.

Bernalillo County's Share of Crashes

Of the four county region of Bernalillo, Sandoval, Valencia and Tarrant Counties, the vast majority of pedestrian and bicyclist crashes take place in Bernalillo County. Also, there is a disproportionate amount of crashes in comparison with county populations. Although Bernalillo County has nearly 75% of the population in the four county region, the percentage of each crash type is much higher.

TABLE 1: Bernalillo , Sandoval, Valencia and Tarrant County Crashes 2008-2011

	Bernalillo County		Sandoval County		Valencia County		Tarrant County		Total
	Number of Crashes	Percent of Total							
Pedestrian Crashes	744	93.9%	33	4.2%	12	1.5%	3	0.4%	792
Bicyclist Crashes	690	94.1%	33	4.5%	9	1.2%	1	0.1%	733
Motorized Crash Only	58,654	87.1%	5,595	8.3%	2,363	3.5%	763	1.1%	67,375
County Population from 2011-2009 American Community Survey	Population	Percent of Total	Total						
	663,557	74.7%	131,877	14.8%	76,540	8.6%	16,467	1.9%	888,441

National Rankings

The National Highway Administration publishes annual reports on pedestrian and bicyclists fatalities. Nationally, pedestrian fatalities make up 14% of all traffic fatalities. For Bernalillo County, pedestrian fatalities make up 23-43% of all traffic fatalities. Likewise, nationally, bicyclist fatalities make up 2% of all traffic fatalities. Although Bernalillo County's bicyclist fatalities make up between 0-17% of all traffic fatalities, these numbers are highly volatile due to the low numbers of bicyclist fatalities in general. Another rate that can be used as a comparison is the percent of the population that live in Bernalillo County. According to the 2008-2011 American Community Survey, 32% of New Mexico's population is in Bernalillo County.

In 2001, 2002, 2004 and 2006, New Mexico ranked first in the nation in the number of pedestrian fatalities per 100,000 people¹. Fortunately, New Mexico has recently dropped in this ranking. However, this past trend and the relatively high number of pedestrian fatalities has led the Federal Highway Administration to designate Albuquerque as a "Focus City" – a city targeted for pedestrian safety improvements.

TABLE 2: Ranking Comparison for Fatal Pedestrian and Bicycle Crashes 2008-2011

Year	NM National Rank for Highest State with Pedestrian Fatalities per 100K Population				Bernalillo County Pedestrian Fatalities as a Percent of Total NM Crash Fatalities				Bernalillo County Bicyclist Fatalities as a Percent of Total NM Crash Fatalities	Total Bernalillo Crash Fatalities (motorized & non-motorized)
	New Mexico	Bernalillo County	Bernalillo County	Bernalillo County	New Mexico	Bernalillo County	Bernalillo County	Bernalillo County		
2008	7	39	13	43.3%	3	7	2	6.7%	30	
2009	7	39	7	23.3%	29	3	0	0.0%	30	
2010	14	33	9	37.5%	2	8	4	16.7%	24	
2011	5	41	9	31.0%	18	1	1	3.4%	29	

¹National Highway Administration Traffic Safety Facts <http://www-nrd.nhtsa.dot.gov/cats/listpublications.aspx?Id=A&ShowBy=DocType>

CRASH SEVERITY

Crashes involving pedestrians and bicyclists are often more severe than motor vehicle crashes. Pedestrian crashes are 25.5 times more likely to result in a fatality and 7.5 times more likely to result in an incapacitating injury than crashes involving a motor vehicle only. Bicyclist crashes are 4 times more likely to result in a fatality and 5 times more likely to result in an incapacitating injury than crashes involving a motor vehicle only. An incapacitating injury is one where the pedestrian, bicyclist or driver needed to be taken away by an ambulance from the crash.

Table 3 shows the severity of crashes. The majority of crashes resulted in a pedestrian or bicyclist injury. There were 7 fatal bicycle crashes during the four year period, which is 1% of all bicycle crashes. Of the 744 pedestrian crashes, 38 were fatal (5% of all pedestrian crashes).

TABLE 3: Crash Severity for Pedestrian, Bicyclist, and Motor Vehicle Crashes

Pedestrian Crash Severity					
	Fatal	Incapacitating Injury	Injury Crash (not incapacitating)	Property Damage Only	Total Pedestrian Crashes
2008	13	36	114	27	190
2009	7	33	104	21	165
2010	9	29	119	22	179
2011	9	37	150	14	210
2008-2011 Total Crashes	38	135	487	84	744
Percent	5.1%	18.1%	65.5%	11.3%	100%

Bicyclist Crash Severity					
	Fatal	Incapacitating Injury	Injury Crash (not incapacitating)	Property Damage Only	Total Bicyclist Crashes
2008	2	19	99	41	161
2009	0	13	120	44	177
2010	4	16	115	41	176
2011	1	19	117	39	176
2008-2011 Total Crashes	7	67	451	165	690
Percent	1.0%	9.7%	65.4%	23.9%	100%

Motor Vehicle Only Crash Severity					
	Fatal	Incapacitating Injury	Injury Crash (not incapacitating)	Property Damage Only	Total Motor Vehicle Only Crashes
2008-2011 Total Crashes	113	1,391	14,706	42,444	58,654
Percent	0.2%	2.4%	25.1%	72.4%	100%

Alcohol Involvement

In general, crashes involving alcohol are much more likely to be fatal. This is especially the case with fatal pedestrian crashes in Bernalillo County. Of the 34 fatal pedestrian crashes, 19 (50%) involved an impaired pedestrian.

The ages of the pedestrians killed ranged from 17 to 88 years. Of the impaired pedestrians killed, the ages ranged from 21 to 73 years.

Of the 7 fatal bicyclist crashes, 1 involved an impaired cyclist. The ages of the bicyclists killed ranged from 34 to 79 years old.

TABLE 4: Fatal Crashes and Alcohol Impairment

Total Bernalillo County Crashes	60,088
All Bernalillo County Crashes Involving Alcohol	2,239
Percent of All Bernalillo County Crashes involving Alcohol	3.7%
Total Fatal Crashes	158
All Fatal Crashes Involving Alcohol	65
Percent of Fatal Crashes Involving Alcohol	41.1%
Total Fatal Crashes Involving Motor Vehicles Only	113
All Fatal Motor Vehicle Only Crashes that involved Alcohol	37
Percent of Fatal Motor Vehicle Only Crashes involving Alcohol	32.7%
Total Fatal Pedestrian Crashes	38
All Fatal Pedestrian Crashes involving an Impaired Pedestrian	19
Percent of Fatal Pedestrian Crashes involving an Impaired Pedestrian	50.0%
All Fatal Pedestrian Crashes involving an Impaired Driver	4
Percent of Fatal Pedestrian Crashes involving an Impaired Driver	11.8%
Total Fatal Bicyclist Crashes	7
All Fatal Bicyclist Crashes involving an Impaired Bicyclist	1
Percent of Fatal Bicyclist Crashes involving an Impaired Bicyclist	14.3%
All Fatal Bicyclist Crashes involving an Impaired Driver	1
Percent of Fatal Bicyclist Crashes involving an Impaired Driver	14.3%

HIGH CRASH AREAS: PEDESTRIANS

There are several locations in Bernalillo County that have high concentrations of pedestrian and/or bicycle crashes. A serious limitation to evaluating these areas is the inability to calculate a true crash rate; that is, the number of crashes per the number of pedestrians or bicyclists for a given location. This is due to the lack of data on the volume of pedestrian and bicyclist traffic in a given area. Despite this limitation, it is helpful to identify these crash concentration locations and use local knowledge of pedestrian and bicycle patterns to infer the relative crash danger.

The high crash areas include several major intersections, as well as areas of concentrated pedestrian and bicycle activity, including the UNM area and Downtown (see Map 1 and Map 5). Of special note is the International District, which had a disproportionate amount of crashes (including fatalities) relative to other neighborhoods in Albuquerque. Several corridors also see a high amount of pedestrian and bicycle crashes. These include both the east and west sections of Central, San Mateo, Montgomery, and Lomas.

High Crash Corridors and Areas

The intersections with the highest number of pedestrian crashes are listed in Table 6, which includes intersections that had 4 or more pedestrian crashes from 2008-2011. The top two intersections for crashes were both along San Mateo: Central and San Mateo (12), and Montgomery and San Mateo (10). These intersections both see high volumes of traffic and are also hubs for transit users (see pedestrian activity section below).

In terms of corridors, Central Ave experienced the most crashes overall, with 5 intersections having 4 or more crashes, including the intersections of San Mateo, Louisiana, Eubank, Rio Grande, and Coors. Indeed, the entire corridor sees more crashes than any other in Bernalillo County (111). These crashes occur along most of its length, not just at few intersections or areas. The confluence of a large number of pedestrians around UNM and Downtown, as well as a high number of transit users at key intersections, lead to an increased likelihood of crashes occurring.

Other corridors with a high number of crashes include Lomas (38), San Mateo (31), Montgomery (20), Coors (19), and Eubank (19). Lomas west of I-25 is of particular note, as this section of the roadway saw 24 crashes.

Although Central Ave and San Mateo may be expected to have a higher number of crashes than other streets, more surprising are the high number of crashes at Cesar Chavez and Broadway (4); Lomas and 3rd St (4); Juan Tabo and Candelaria (4); and Ouray and Coors (3).

Crash Rates

One method to evaluate intersection safety is to compare the number of crashes at each intersection to the volume of cars passing through the intersection in a given time period. Comparing these two factors generates a crash rate, showing the relative likelihood of a crash happening at a given intersection.

In Bernalillo County, some of the intersections with the most crashes also have a high crash rate, including San Mateo and Central, and Central and Louisiana. Other intersections of note include several downtown, including Gold and 2nd, Marquette and 5th, Central and 6th, Gold and 5th, and Gold and 6th. However, most of the streets with the highest crash rates are local roads that see a low volume of traffic. In these cases, only one crash may have been recorded in a 4 year time span, yet the crash rate is higher than busier intersections around town.

Table 6 includes a crash rate based on the number of vehicles approaching the intersection similar to the rates published in MRCOG’s annual safety report. This rate is calculate by:

$$\frac{\text{Pedestrian Crashes 2008 to 2011}}{\text{Average Intersection Volume from 2008 to 2011} \times 365 \frac{\text{days}}{\text{year}} \times 4 \text{ years}} * 1,000,000 \text{ motor vehicles}$$

Pedestrian Intersection Safety Index

Another way to measure intersection safety is using the Federal Highway Administration’s *Pedestrian Intersection Safety Index* (Ped ISI). This methodology uses six basic roadway attributes to determine an intersection’s safety: 1) Whether the intersection is signalized or not; 2) whether the intersection includes a stop sign; 3) number of lanes; 4) 85th percentile speed; 5) ADT; and 6) whether the intersection is surrounded by commercial land uses. The factors produce a score from 1-6, with higher numbers indicating less safe intersections based on a combination of these factors. For example, San Mateo, with 6 lanes, a posted speed limit of 40, and 30,000 average daily traffic, scores a 3.6, while Ridgecrest, with two lanes, a 25 MPH speed limit, and 2200 ADT, scores a 1.73.

The full publication, *Pedestrian and Bicyclist Intersection Safety Indices* can be found at: <http://www.fhwa.dot.gov/publications/research/safety/pedbike/06130/> for this report the following simplified equation was used to calculate Pedestrian Intersection Safety Index (ISI)

$$\text{Pedestrian ISI} = 2.372 - 1.867 * \text{Signalized Intersection}(0 \text{ or } 1) + 0.335 * \text{Number of Lanes} + 0.018 * \text{Posted Speed} + \text{Average Daily Traffic} \times 10^{-6} * 0.238 * \text{Commercial Area}(0 \text{ or } 1)$$

In Bernalillo County, many of the intersections with the most crashes also have high pedestrian ISI scores. All of the top 10 intersections for pedestrian crashes have an ISI of 3.5 or higher. This indicates that these roadways are unsafe by design, and are hostile to pedestrians. It should be noted that many intersections in downtown are rated much safer, although downtown still sees a high number of crashes involving pedestrians (see Map 3). This not only indicates a higher volume of pedestrian traffic, but also an opportunity to focus on improving the walkability of downtown. The highest scores (over 4) are seen along NM 528, Paseo del Norte, and Coors.

Table 6: Intersections with the Highest Number of Pedestrian Crashes 2008-2011

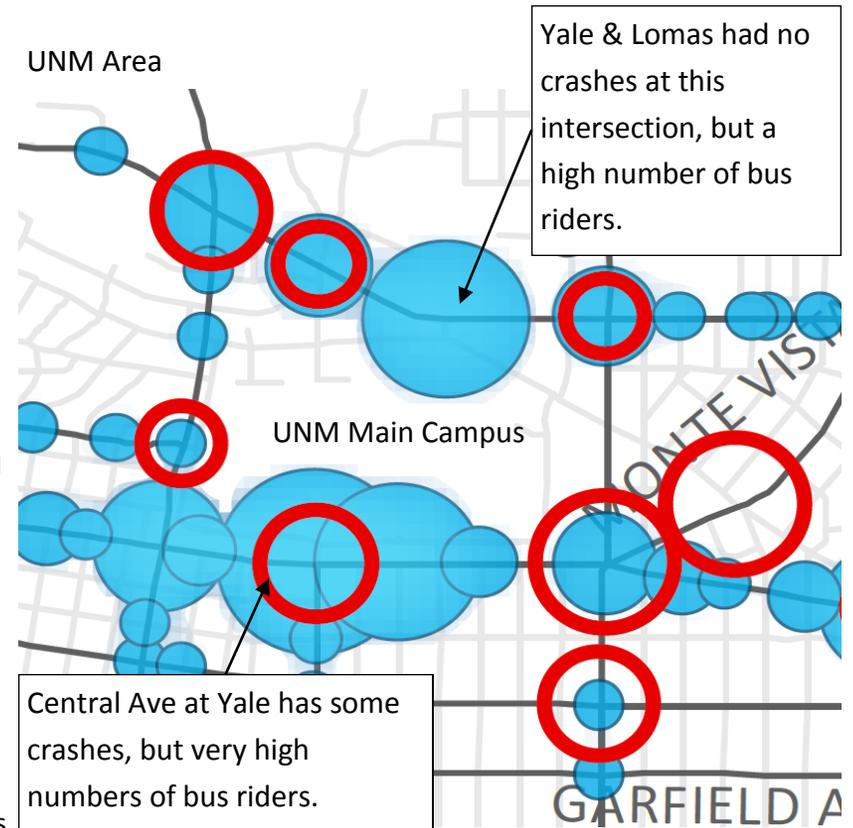
Intersection	Crashes	Average Intersection Volume per Day	Crash Rate	Intersection Safety Index	Bus Riders per Day
Central Ave and San Mateo Blvd NE	12	54,113	0.1519	3.62	4,939
Montgomery Blvd NE and San Mateo Blvd NE	10	75,679	0.0905	3.70	1,083
Central Ave and Louisiana Blvd SE	9	44,454	0.1387	3.56	2,210
Central Ave and Eubank	7	56,776	0.0844	3.73	1,095
Central Ave and Rio Grande Blvd SW	6	38,004	0.0811	3.52	724
Central Ave and Coors	5	49,499	0.0692	3.50	1,899
Avenida Cesar Chavez and Broadway Blvd SE	4	44,698	0.0613	3.55	33
Gibson Blvd SE and San Mateo Blvd NE	4	33,605	0.0611	3.65	171
Lomas Blvd NW and 3rd St NW	4	29,160	0.094	3.53	N/A
San Mateo Blvd NE and Menaul Blvd NE	4	66,047	0.0415	3.58	661
Montgomery Blvd NE and Jefferson St NE	4	49,146	0.0418	3.41	150
Juan Tabo Blvd NE and Candelaria Rd NE	4	36,485	0.0751	3.63	44

Places of High Pedestrian Crashes

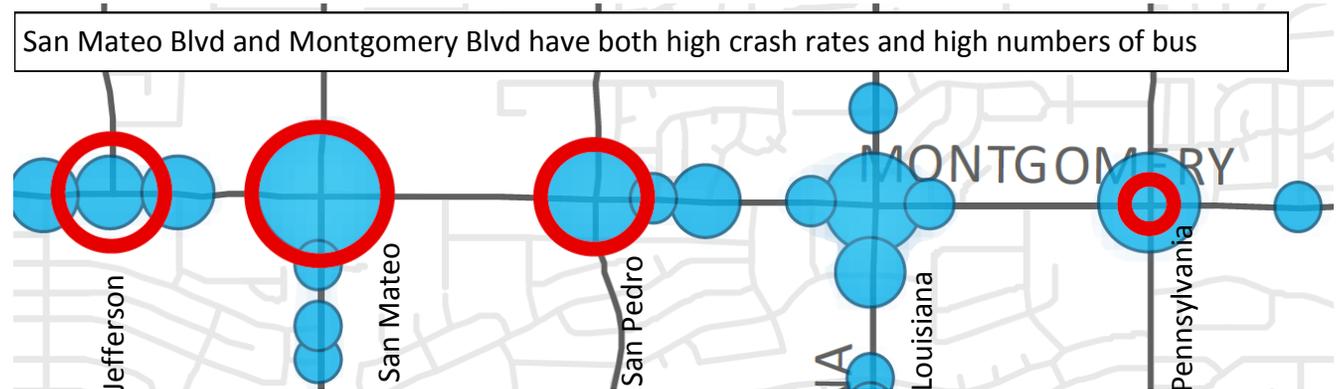
Although ongoing counts of pedestrian activity within Bernalillo County do not exist, a good proxy measure is the amount of transit riders boarding and alighting at each transit stop. This measurement has a complete dataset, as ABQ Ride counts all riders for each of its routes, and performs surveys to determine where riders are boarding and alighting. From these data, we can get a sense of how many people may be congregating in an area on a daily basis. This is a useful measure because all transit riders are also pedestrians at some point: either when they are walking to a transit stop, or when they disembark at their destinations. The average bus ridership per day for 2011 is shown on the Crash Rate & Bus Riders Map (Map 4).

These data reveal that a high amount of pedestrian activity is generated at key transit stops along Central Ave (UNM, Central and San Mateo, Central and Louisiana, Central and Wyoming, Central and Coors), as well as Lomas and Montgomery. In addition, there is significant activity in Downtown, specifically at Alvarado Transit station. Uptown Transit Center also sees a large amount of transit riders.

Comparing ridership locations to crash data is revealing as it shows that areas of higher ridership are correlated with more pedestrian crashes. This can be seen at several dangerous intersections including Central and San Mateo, Central and Louisiana, Central and Rio Grande, Uptown Transit Center, Montgomery and Lomas, and Central and Coors. It also shows intersections without nearby transit riders but relatively higher crash rates. These include Ouray and Coors, sections of Gibson, Indian School and San Mateo, sections of Candelaria, and several intersections in the NE Heights between Academy and Paseo del Norte.



Montgomery Blvd from Jefferson to Pennsylvania





Examples of dangerous intersections and corridors. Clockwise: Central and San Mateo looking west, Central and San Mateo looking east, San Mateo and Montgomery, and NM 528 near Intel.



Examples of pedestrians and bicyclists in hostile environments. Top: Central Ave at the NM Expo (fairgrounds) during the Saturday Flea Market. Bottom: Bicyclist riding on the sidewalk on Central Ave. Critical Mass bike ride on Lomas, June 2013. Photo by Dan Majewski and Urban ABQ (URBANABQ.COM; FACEBOOK.COM/URBAN.ABQ).

Pedestrian Maps Overview

Crashes Involving Pedestrians

The basic pedestrian crash map shows fatal pedestrian crashes with a red star and the location of other pedestrian crashes with a black dot. If more than one crash happened at the same location or if there were several crashes clustered together a blue halo is added to the area.



Pedestrian Intersection Crash Rate

The map showing the crash rate based on motor vehicles focuses on intersections. The higher the rate the larger the circle around the intersection. Here locations with low volumes of traffic strongly influence raising this rate.



Pedestrian Intersection Safety Index Scores

The Pedestrian Intersection Safety Index map also focuses on intersections. Intersection safety scores were calculated only at intersections with pedestrian crashes in the 2008-2011 time frame. The more red the intersection, the less safe it is based on higher volumes of traffic, more lanes, lack of signalization and if the intersection is in a commercial area.

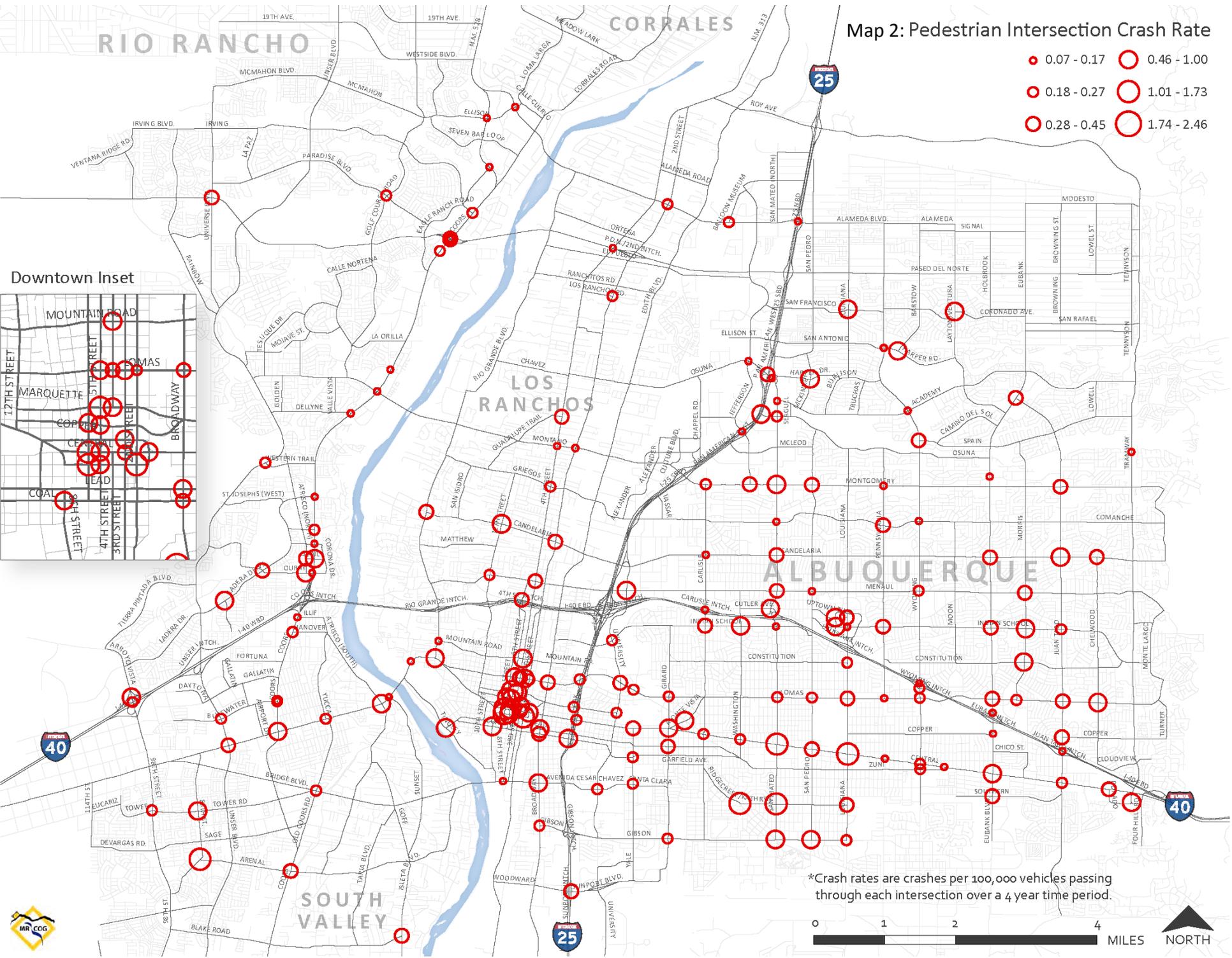
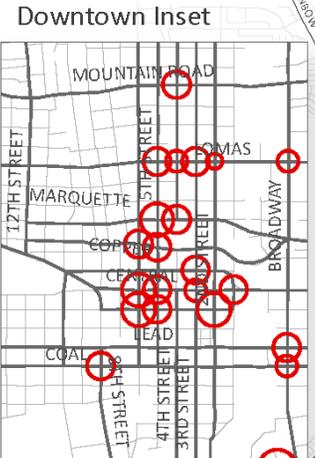
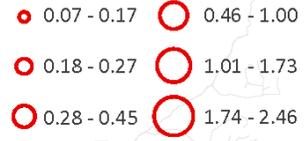


Pedestrians Crash Rate & Average Transit Rider per Stop per Day

Finally, the bus ridership map shows the 2011 daily average number of people alighting and departing the bus for each bus stop. This is a good estimate of the pedestrian activity both at intersections and along the corridors.



Map 2: Pedestrian Intersection Crash Rate



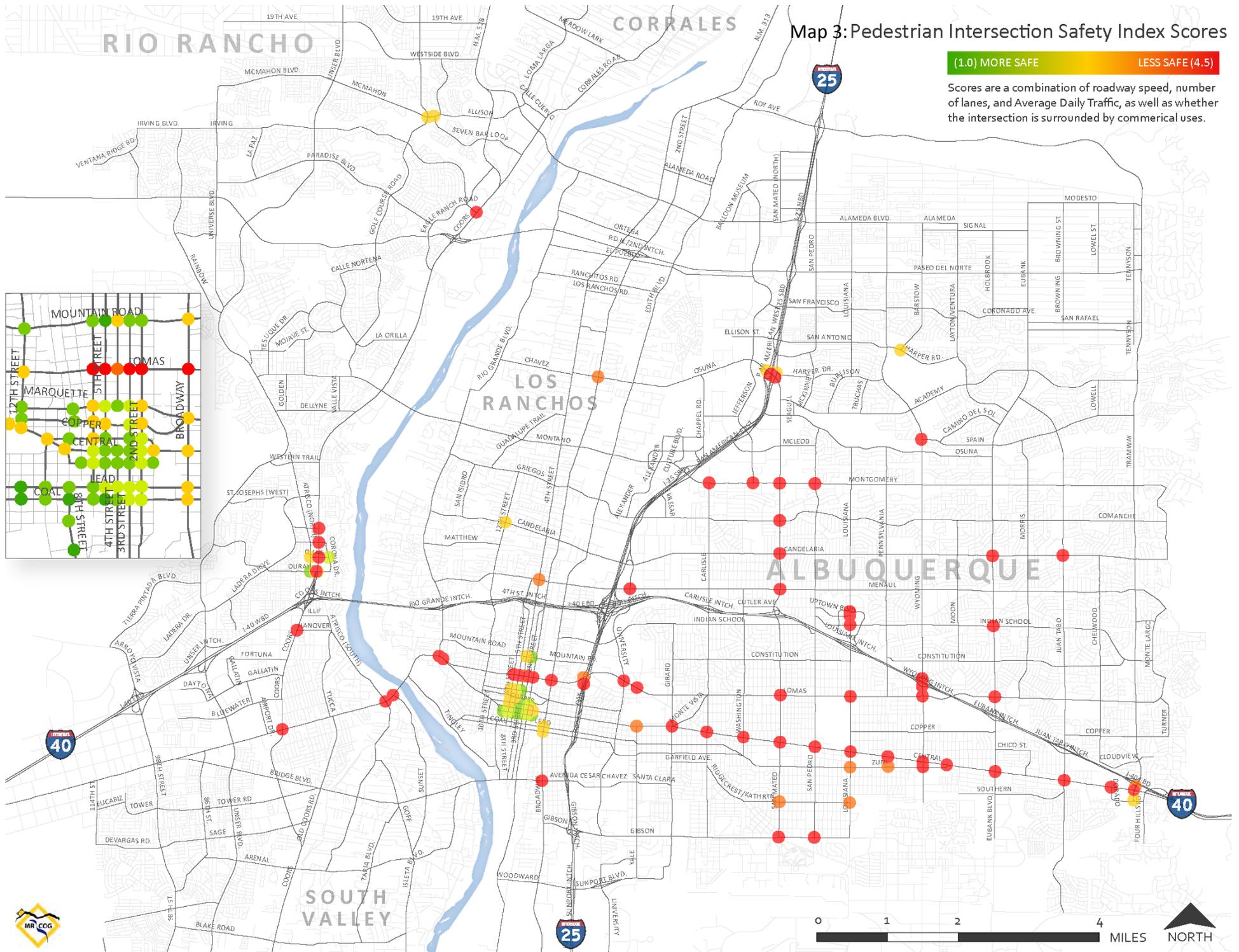
*Crash rates are crashes per 100,000 vehicles passing through each intersection over a 4 year time period.

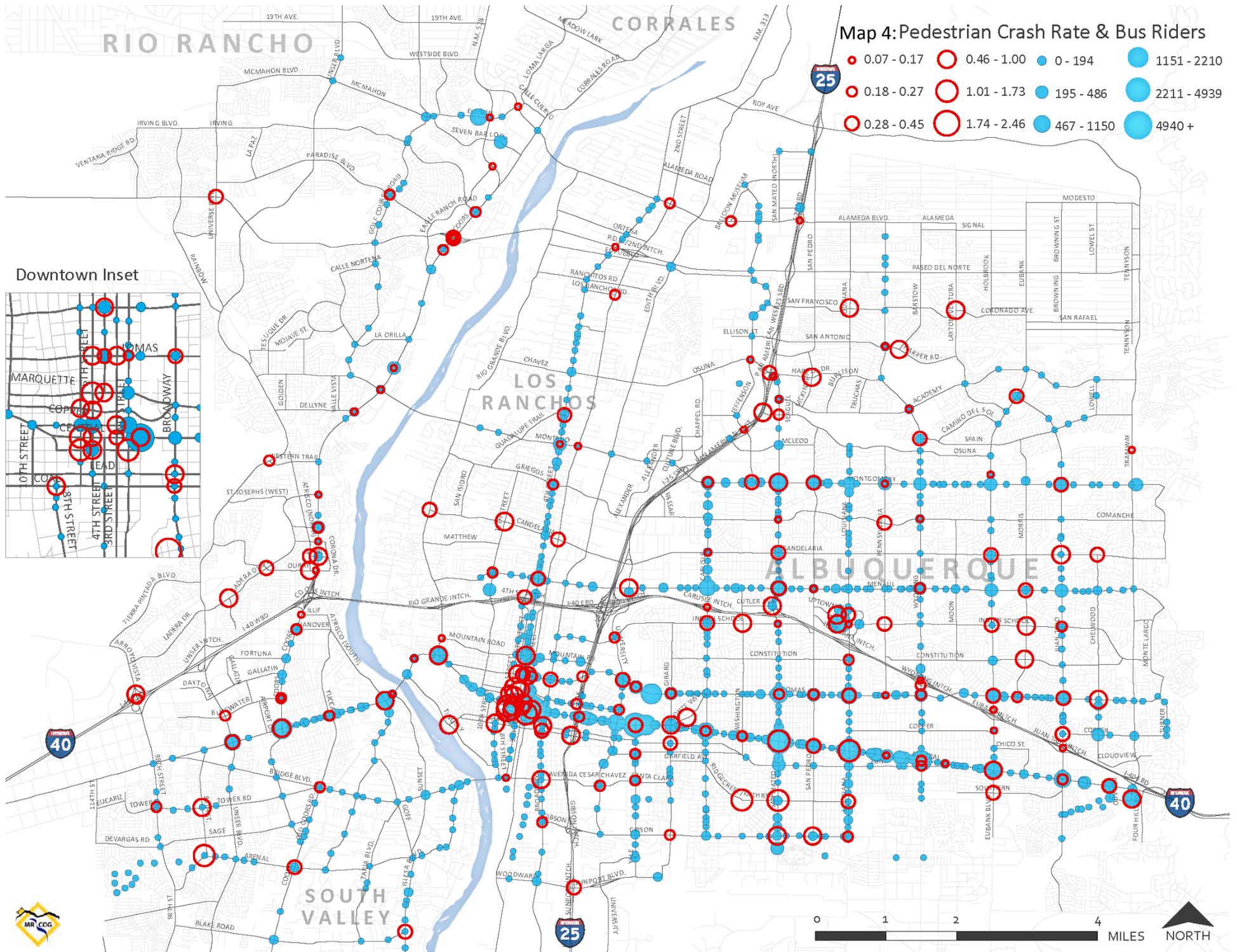


Map 3: Pedestrian Intersection Safety Index Scores

(1.0) MORE SAFE LESS SAFE (4.5)

Scores are a combination of roadway speed, number of lanes, and Average Daily Traffic, as well as whether the intersection is surrounded by commercial uses.





HIGH CRASH AREAS: BICYCLISTS

Table 7 lists the top intersections for bicycle crashes. As with pedestrian crashes, a large number of crashes occur along Central, including the top three intersections for bicycle crashes: Central and San Mateo (8); Central and Yale (7); and Central and Coors (7).

The top corridors for bicycle accidents include: Central (71), Lomas (33), Montgomery (21), Menaul (16), Wyoming (16), Tramway (15), Indian School (14) and San Mateo (14). Of these streets, only Tramway and Indian School have dedicated bicycle infrastructure.

In general, bicycle crashes are correlated with streets without bicycle infrastructure. In Bernalillo County, the average distance of each crash from a street with dedicated bicycle infrastructure was 836 feet. In addition, 426 out of 690 (61.7%) crashes happened on streets without dedicated bicycle infrastructure. Many of these crashes happened in downtown Albuquerque, around UNM, and along major roadways in the SE Heights (see Bicycle Crash Distance Map 6).

Places of High Bicyclist Activity

As with pedestrian counts, data on bicycle ridership by route does not exist. However, recreational user bicycle data is collected by Strava, a company that allows users to track their rides and performance. Their dataset contains thousands of entries from recreational users and provides a snapshot of the routes bicyclists take and the volume of riders on these routes. As can be expected, Strava data shows that many recreational riders frequent the bike trails and streets with dedicated bicycle infrastructure. A Strava map of bicycling activity in Bernalillo County can be found at: <http://labs.strava.com/heatmap/#12/-106.62944/35.11700/blue/bike>

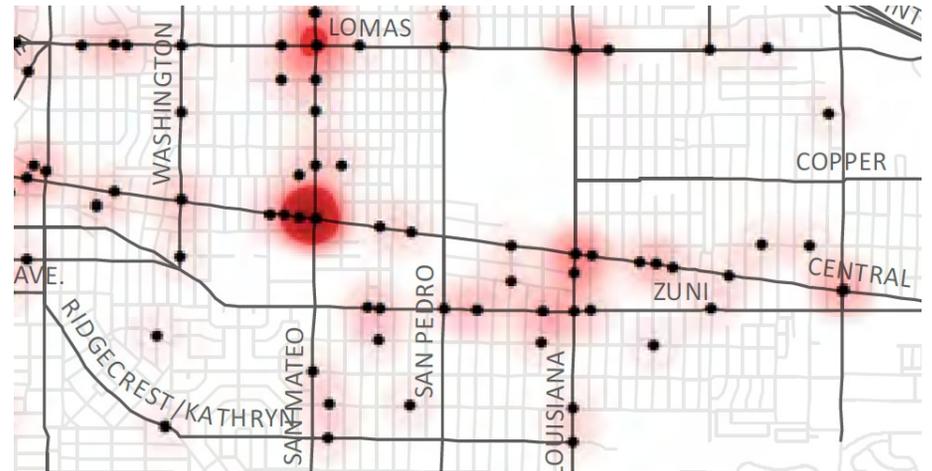
TABLE 7: Intersections with the Highest Number of Bicyclist Crashes 2008-2011

Intersection	Bicyclist Crashes	Nearest Bike Infrastructure (ft)
Central and San Mateo	8	250
Central and Yale	7	700
Central and Coors	7	0
Lomas and Juan Tabo	5	2,500
Montgomery and Tramway	4	0
Montgomery and Pennsylvania	4	0
Montano and 4th	4	0
Broadway and MLK	4	0
Lomas and San Mateo	4	2,650
Central and Stanford	4	700
Carlisle and Constitution	4	0

Bicycle Maps Overview

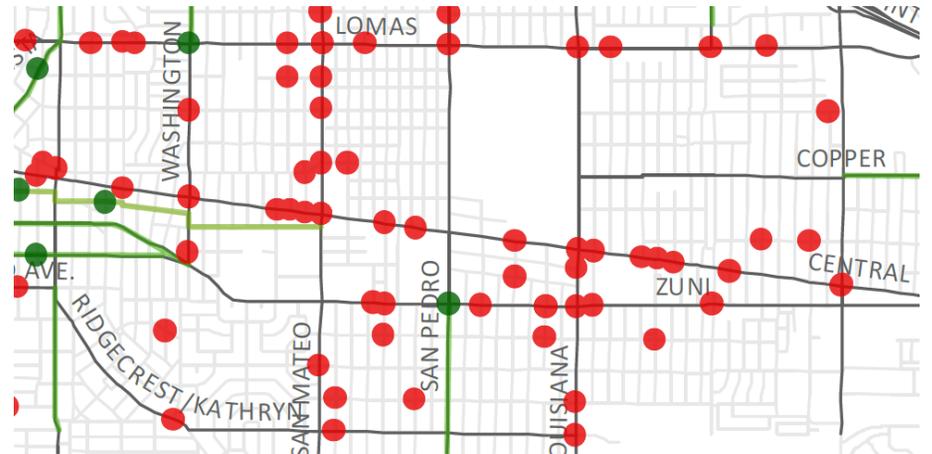
Crashes Involving Bicyclists 2008-2011

The basic bicyclist crash map shows fatal bicyclist crashes with a blue star and the location of other bicyclist crashes with a black dot. If more than one crash happened at the same location or if there were several crashes clustered together a red halo is added to the area.



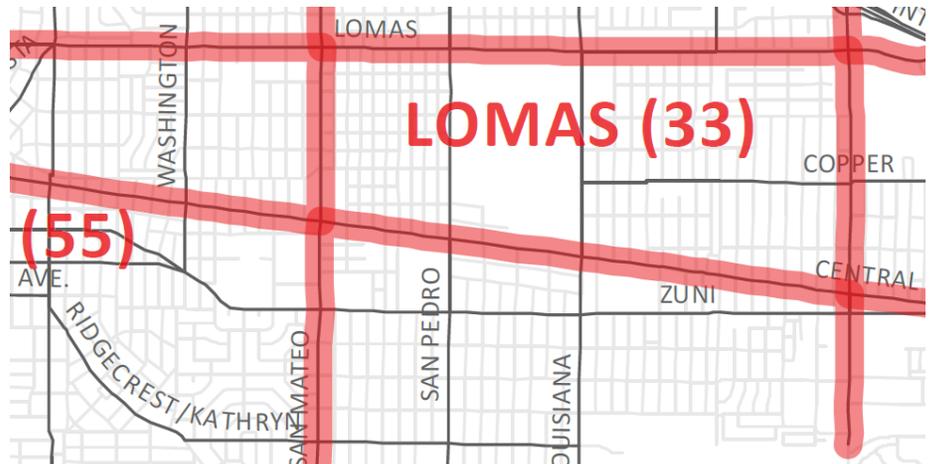
Bicycle Crash Distance from Bike Infrastructure

Green dots show the location of bicycle crashes that occurred on a roadway with a bicycle facility, a side path or a bicycle lane. If the crash occurred on a roadway without bicycle facilities, it is shown with a red dot. Of all the bicycle crashes, the majority, 61.7% occurred on roadways without bicycle facilities.

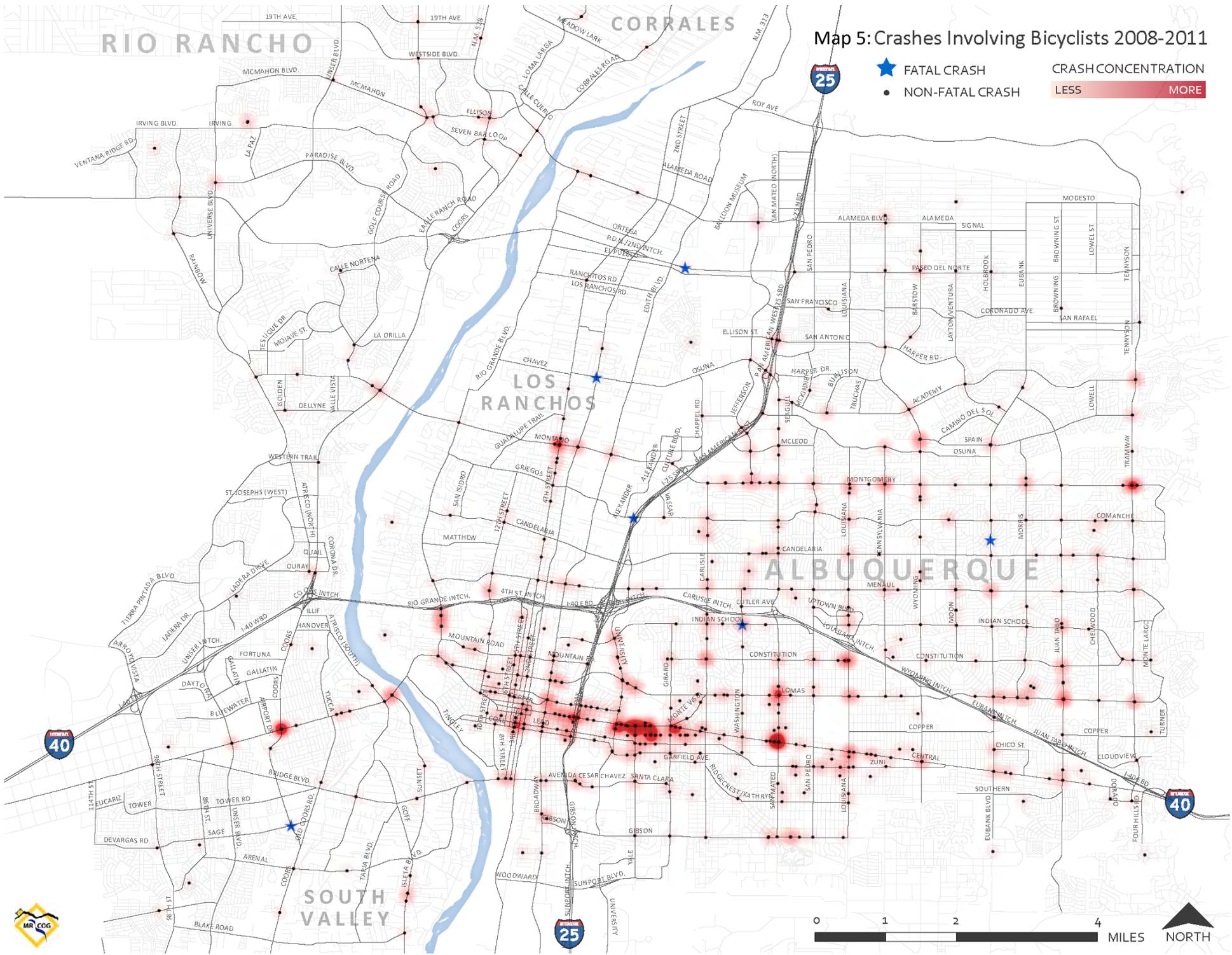


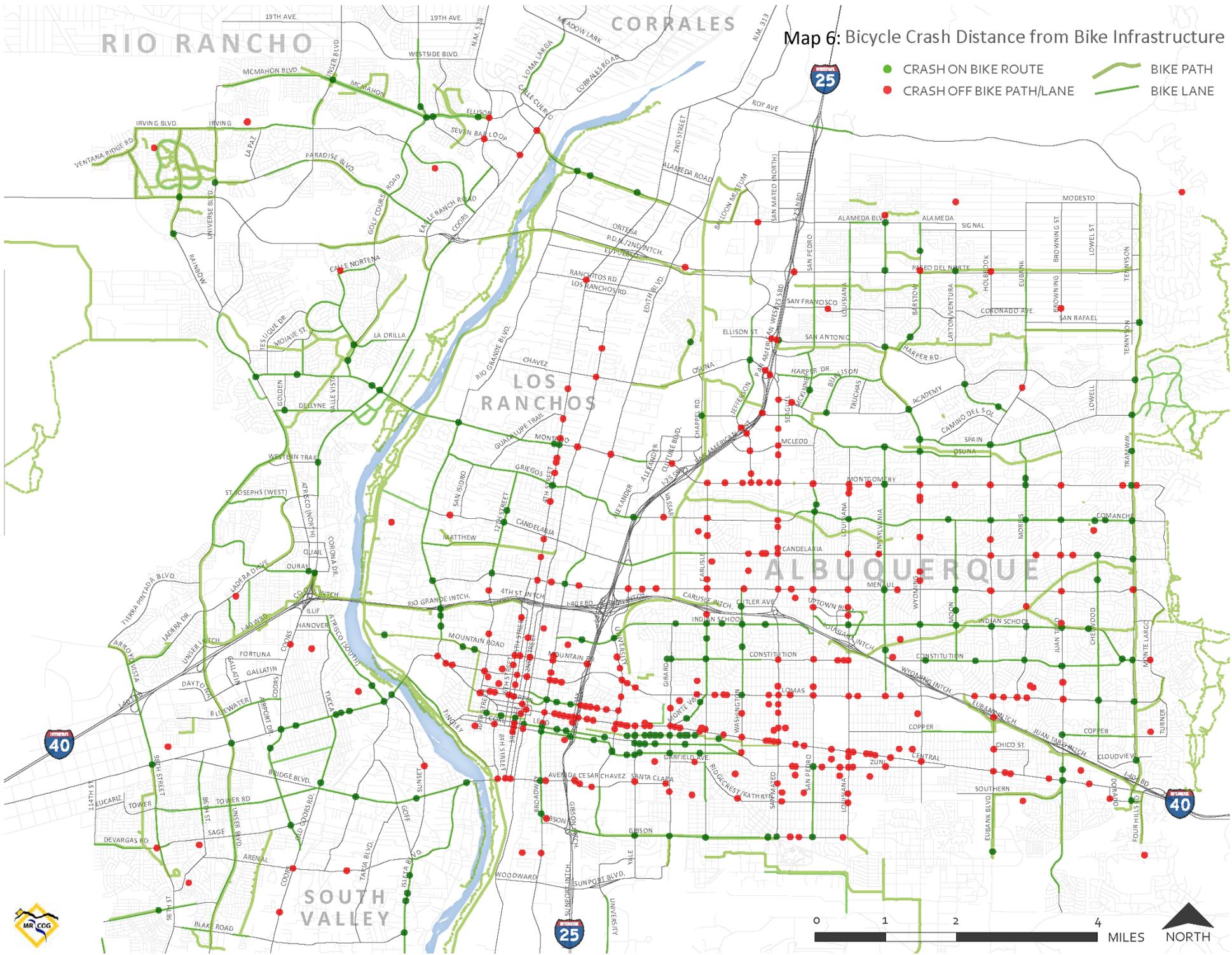
Top Corridors for Bicyclist Crashes

This map shows the top ten corridors for bicycle crashes. The number of bicyclist crashes was summed over every street and compared. Central Ave was broken up into West and East divided by the river. East Central has by far the most bicyclist crashes with 55 over the four year period. In second place was Lomas with 33 crashes.

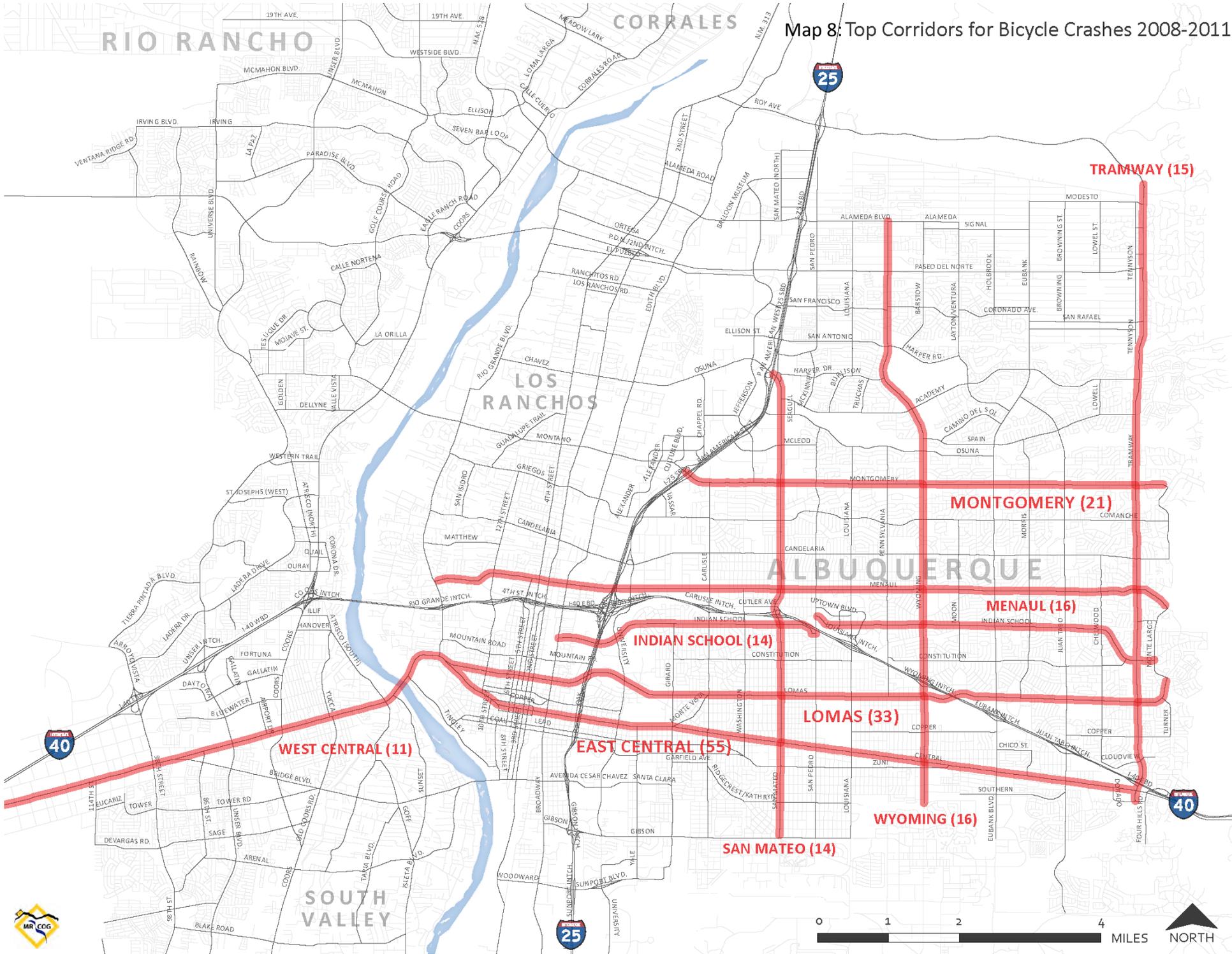


Map 5: Crashes Involving Bicyclists 2008-2011





Map 8: Top Corridors for Bicycle Crashes 2008-2011



DEMOGRAPHICS OF PEDESTRIANS & BICYCLISTS INVOLVED IN CRASHES

There is little information on the characteristics of the people involved in the crash, but age and gender are reported. Below are basic charts showing these demographic characteristics. These charts do not show the number of crashes where age and gender were not reported.

CHART 1: Gender of Pedestrians & Bicyclists Involved Crashes

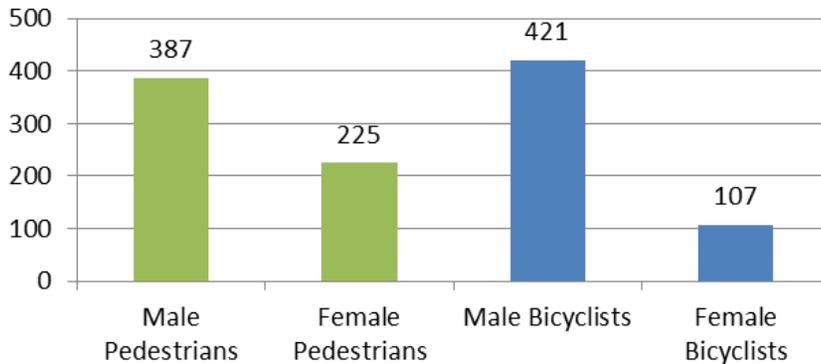


CHART 2: Pedestrian Age

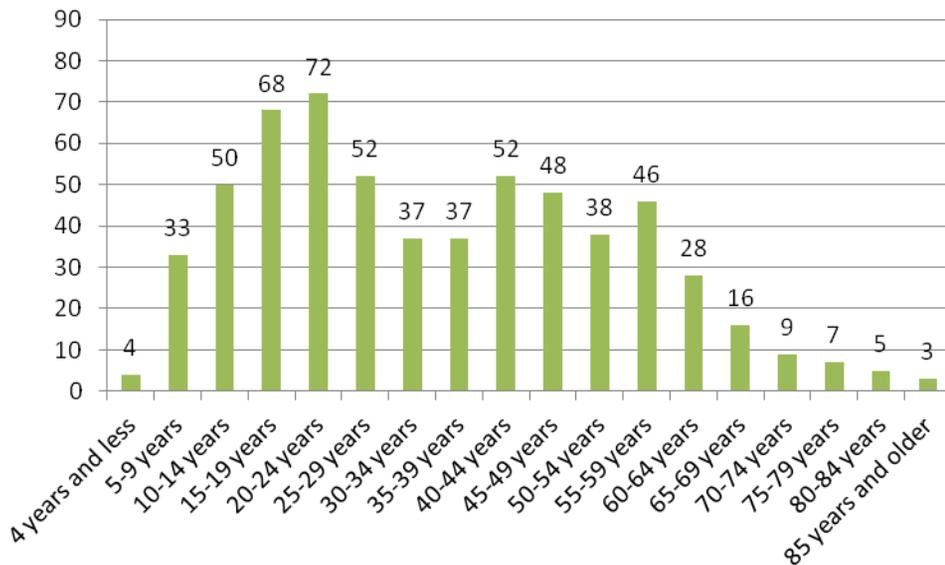
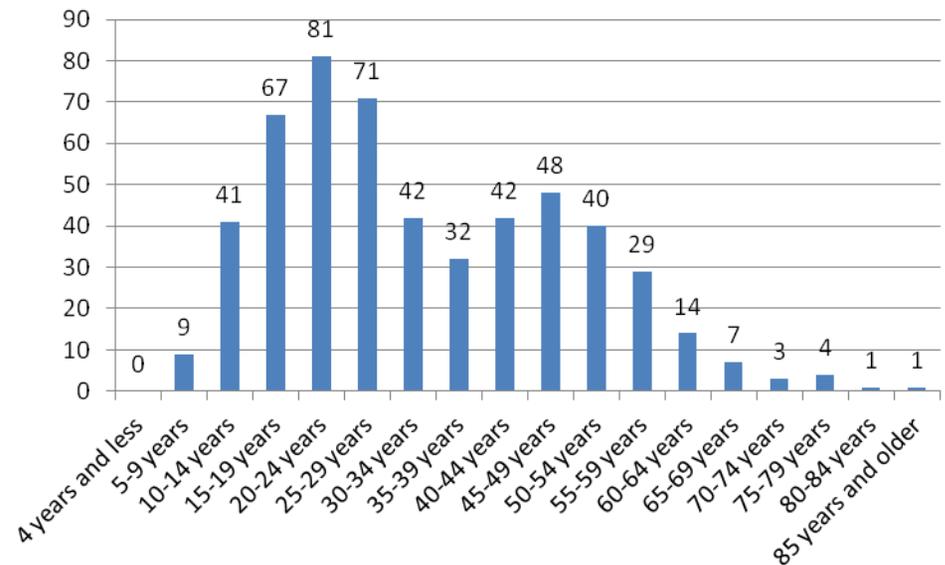


CHART 3: Bicyclist Age



Month of the Year and Day of the Week for Crashes

Pedestrian crashes were relatively steady throughout the year with a drop during the hot months of June and July. Bicyclist crashes appear to peak in fall. Like crashes in general, most pedestrian crashes occur on Friday. Bicyclist crashes peaked on Wednesday.

CHART 4: Month of Pedestrian Crashes

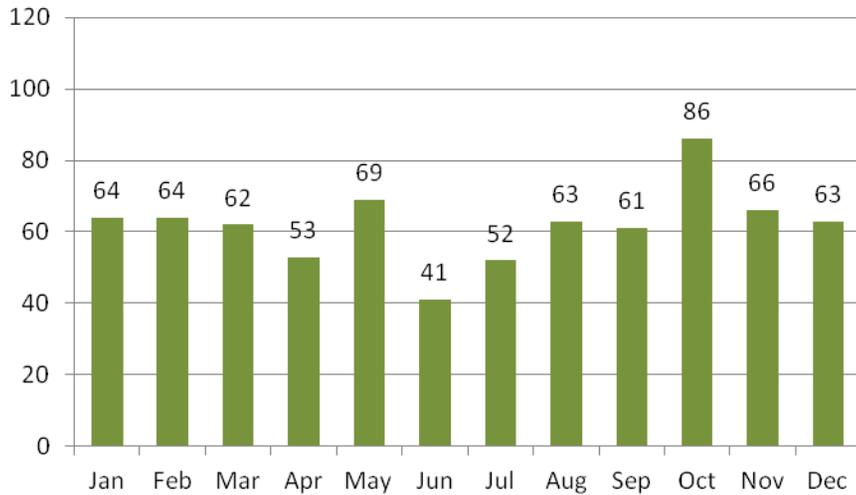


CHART 5: Month of Bicyclist Crashes

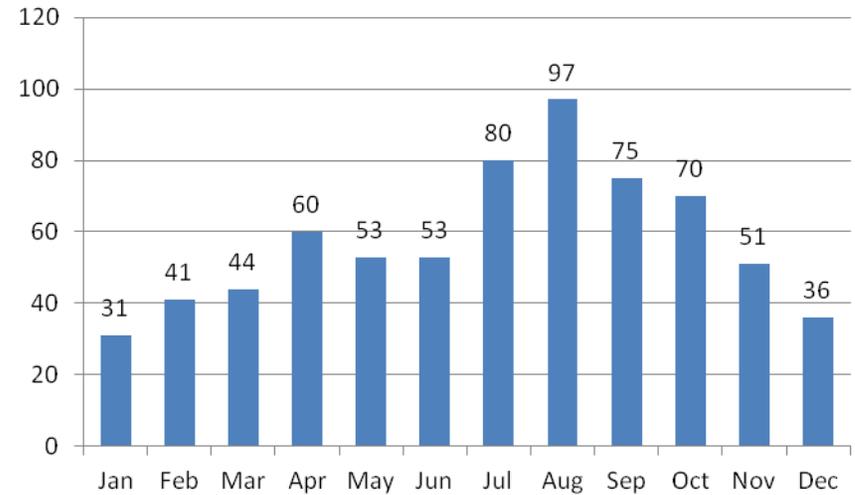


CHART 6: Day of the Week for Pedestrian Crashes

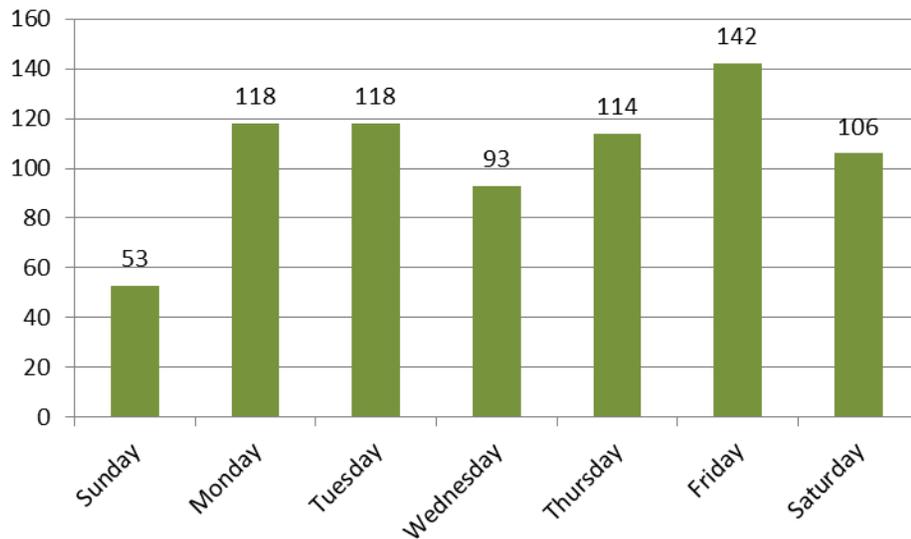
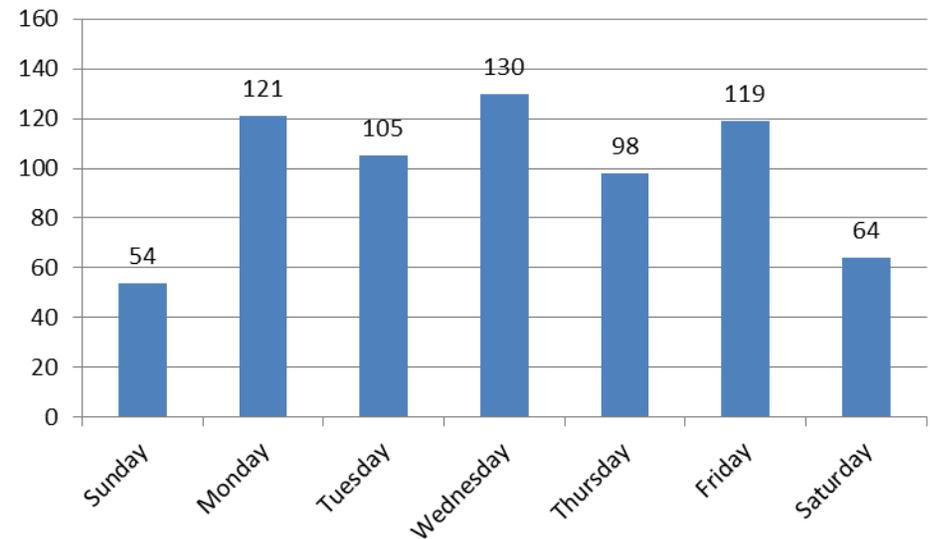


CHART 7: Day of the Week for Bicyclist Crashes



Time of Day for Crashes

Most crashes occurred on the weekdays. There tended to be two peak crash periods: a small morning one and a much larger late afternoon/evening peak. Crashes for weekends are not shown here, but they only have an evening peak between 5-7 pm for both modes.

CHART 8: Weekday Pedestrian Crashes by Time of Day

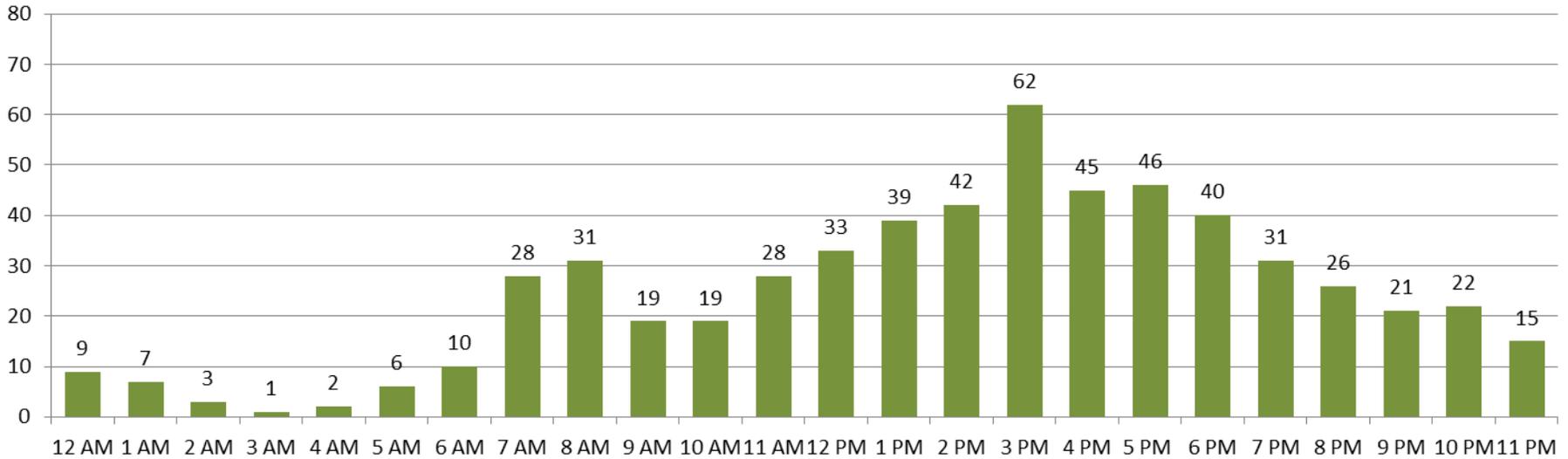


CHART 9: Weekday Bicyclist Crashes by Time of Day

